# SOMETHING HAPPENS

## what we know about the chemistry of desire

FOR SOME OF US, it happens once in a lifetime; for others, a few times. For many people, it seems to happen every Friday night. Regardless of how often it happens, one thing seems clear: Falling in love makes all of us feel good.

From the instant we become attracted to someone, our energy level begins to surge. We become so overstocked with adrenaline that we can put our basic needs on indefinite back order. Our heart starts racing, our breath comes more quickly; we feel excited, euphoric. To those of us who have taken amphetamines, it feels exactly as if we were on speed.

*What* happens? For the answer, we turn to . . . science.

•

It is no coincidence that falling in love makes us feel as if we were speeding. In recent years, medical researchers have come to believe that romantic attraction and stimulant drugs such as cocaine and amphetamines affect our brain chemistry in much the same way. Much of the research that has been done in this area is examined by Dr. Michael R. Liebowitz in *The Chemistry of Love*. Dr. Liebowitz is the director of the Anxiety Disorders Clinic at the New York State Psychiatric Institute and an associate professor of clinical psychiatry at the College of Physicians and Surgeons at Columbia University.

"What seems likely," says Liebowitz, "is that the same neurochemical events that underlie many kinds of pleasure and stimulant-drug arousal are also involved when we feel very attracted to someone." That could account for why the feelings are so similar and, he adds, "for the bad judgment that both amphetamine users and lovers sometimes show."

While acknowledging that it may seem strange to compare romantic feelings to drug-induced states, Liebowitz points out that drugs work not by creating new chemical reactions in our bodies but by speeding up or slowing down existing processes. It is interesting to note that he makes no distinction between the neurochemistry of men and of women. Despite the differences in our anatomical designs, our chemical wiring seems to have the same scheme.

•

To understand what happens neurochemically when we begin to fall in love, we must have an idea of how the nervous system works. When the brain sends a signal through the nervous system, it is carried through the nerve cells and across the synapses by chemical substances called neurotransmitters, of which medical researchers have discovered more than 30. Two important ones, for our pleasurable purposes, are dopamine and norepinephrine.

To move down the biochemical chain of command, the neurotransmitters must attach themselves to a set of receptors on each cell. Each receptor, it appears, can receive only one specific neurotransmitter.

In the late Seventies, scientists discovered that the brain has receptors for narcotics such as opium and heroin, as well as Valium. That led to the discovery that the body contains naturally occurring narcotics that are called endorphins or enkephalins, depending on their size. Although it seems clear that these chemicals are powerful painkillers and can calm us down under stress, it is not clear just how they work. Some seem to function by stimulating the receptors; others, by blocking them.

Curiously, one type of psychoactive drug for which there does not appear to be a specific receptor is amphetamine. Speed, it seems, affects the nervous *(concluded on page 144)*

## SOMETHING HAPPENS *(continued from page 84)*

*"The natural high of being head over heels in love eventually wears off, just as drugs run out."*

system *indirectly* by inducing the brain to crank out high levels of norepinephrine and dopamine—the same two neurotransmitters that are released at gusher levels during romantic attraction.

Dopamine and norepinephrine seem to work their magic by lowering the activation threshold of the brain's pleasure center, which is located in the limbic region of the brain. The limbic system is primarily responsible for our ability to experience emotions. Dopamine interacts with testosterone (a hormone that both sexes share), which fuels sexual desire, and thus may be the chemical that puts the lust into love.

The neurotransmitter activity triggered by romantic attraction prompted Liebowitz to quip in a *New York Times* interview that love could be viewed as a "brain bath" of dopamine and norepinephrine.

•

If only it were that simple. It appears that the brain must first be showered with phenylethylamine, or PEA, a naturally occurring chemical in the brain that is one carbon atom away from amphetamine. Liebowitz believes that it is PEA—or some other amphetaminelike substance—that causes the brain to release the dopamine and norepinephrine.

In addition to giving new meaning, and perhaps respect, to the notion of a PEA brain, it brings us to a crucial question: Do we fall in love when we are producing more PEA, or do we produce more PEA when we are falling in love?

Liebowitz can say only that when we encounter someone who meets our personal set of emotional and physiological criteria, a switch in our limbic system is "automatically thrown" and "our limbic pleasure centers go bonkers."

In other words, something happens.

It is worth noting that some foods—chocolate, in particular—have high levels of PEA. That raises the question of whether or not we could simulate the feeling of falling in love—or at least lust—by doing some serious choco loading. At the very least, it would be a cheap date.

The answer to that seems to depend on whether or not we can hold the MAO.

MAO stands for monoamine oxidase, a class of brain enzymes that regulate our emotional states. Just as digestive enzymes break down, or metabolize, food in the stomach, MAO is a primary metabolizer of various neurotransmitters, including dopamine, norepinephrine and PEA. Sadly, it turns out that PEA in food is metabolized so quickly that it doesn't have time to reach the blood stream, much less the brain.

We all know that the natural high of being head over heels in love eventually wears off, just as drugs inevitably run out. As our body chemistry returns to normal, the exhilaration of romantic attraction usually gives way to the comfort and security of romantic attachment.

According to Liebowitz, the pleasurable feelings of attachment may involve not only a stimulation of the brain's pleasure center but also a reduction of anxiety, which suggests the involvement of another brain network, the *locus coeruleus*. Researchers believe that this area acts as a human alarm center that regulates our feelings of anxiety, fear and depression.

Attachment also appears to be the stage at which the brain's production of natural narcotics, the endorphins, comes into play. While it is not clear whether the endorphins affect us by blocking or stimulating our receptors, they do seem to elevate our pain threshold and, medical researchers believe, may strengthen our immune system as well. Thus, it's possible that being in love provides us the added benefit of making it easier to stay healthy.

For the most part, those of us who have experienced the exhilaration of falling in love also know well the pain and sadness of falling out of love. From a neurochemical standpoint, our production of PEA appears to drop and our reservoir of dopamine and norepinephrine shrinks to the size of a birdbath. Factor in decreased receptor sensitivity and you're looking at a virtual shutdown of the pleasure center.

Another neurochemical factor that may be involved has to do with the activity of MAO. That notion is based on the effectiveness of a class of drugs called the MAO inhibitors in treating certain types of extended depression. These drugs work by blocking the enzymes from breaking down neurotransmitters, thus preventing the reservoir from drying up.

Whether it's high MAO, low PEA, too little dopamine and norepinephrine or clogged receptors that turns us into chemical basket cases when we go through the trauma of breakup, there seems to be little doubt as to what's needed to get those neurochemical circuits firing again.

All it takes is a wink or a nod, and in the blink of an eye, our limbic switch is back in the ON position. —PAUL ENGLEMAN

*"So he goes, 'You want to get married?' and I'm, like, 'Yeah.'"*